AMENDMENTS TO THE CLAIMS

Claims 1-12 (CANCELLED)

13. (New) An optical amplifier employing a rare earth-doped fiber as an amplification medium, the optical amplifier comprising:

an input monitoring unit that monitors full input light and outputs an input monitor signal;

an output monitoring unit that monitors full output light and outputs an output monitor signal;

an amplified-spontaneous-emission compensating circuit that compensates for an amplified-spontaneous-emission component contained in the output monitor signal;

a gain-variation-level compensating circuit that calculates a target average setup gain that is determined based on a signal intensity of the input monitor signal; and

a constant gain control circuit that performs a gain control based on an output signal from the amplified-spontaneous-emission compensating circuit and the target average setup gain.

14. (New) The optical amplifier according to claim 13, wherein

either one of the constant gain control circuit and the gain-variation-level compensating circuit includes a storage area, and

an output gain profile used for the gain control is stored in the storage area.

15. (New) The optical amplifier according to claim 14, wherein

the output gain profile is generated based on the signal intensity of the input monitor signal for each signal intensity.

16. (New) The optical amplifier according to claim 13, wherein

the amplified-spontaneous-emission compensating circuit outputs an amplified-spontaneous-emission compensation signal obtained by subtracting the amplified-spontaneous-emission component contained in the output monitor signal from the output monitor signal,

the gain-variation-level compensating circuit outputs a subtraction signal obtained by subtracting an offset component determined based on the signal intensity of the input monitor signal from the amplified-spontaneous-emission compensation signal, and

the constant gain control circuit performs the gain control in such a manner that a ratio of the subtraction signal to the input monitor signal becomes identical to the target average setup gain determined based on the signal intensity of the input monitor signal.

17. (New) The optical amplifier according to claim 16, wherein

the gain-variation-level compensating circuit includes

a compensation-level setting unit that generates a gain compensation signal of a constant level; and

a subtracting unit that subtracts the gain compensation signal from the output monitor signal, and outputs a result of subtraction.

18. (New) The optical amplifier according to claim 16, wherein

the gain-variation-level compensating circuit includes

a compensation-level setting unit that generates a gain compensation signal of a constant level; and

a subtracting unit that subtracts the gain compensation signal from the input monitor signal and outputs a result of subtraction.

19. (New) The optical amplifier according to claim 13, further comprising:

a forward pumping-light source that injects a pumping light into the rare earth-doped fiber in a same direction as a direction of traveling of the full input light.

20. (New) The optical amplifier according to claim 19, wherein

the forward pumping-light source includes a semiconductor laser equipped with a wavelength stabilizing unit.

21. (New) The optical amplifier according to claim 13, wherein

a glass host material of the rare earth-doped fiber is any one of silicon oxide, tellurite oxide, and bismuth oxide.

22. (New) An optical amplifier employing a rare earth-doped fiber as an amplification medium, the optical amplifier comprising:

an input monitoring unit that monitors full input light and outputs an input monitor

signal;

an output monitoring unit that monitors full output light and outputs an output monitor signal;

an input-level converting circuit that outputs

a subtraction signal obtained by subtracting an amplified-spontaneous-emission component contained in the output monitor signal; and

an offset component determined based on a signal intensity of the input monitor signal from the input monitor signal; and

a constant gain control circuit that performs a gain control in such a manner that a ratio of the output monitor signal to the subtraction signal becomes identical to a target average setup gain determined based on the signal intensity of the input monitor signal.

23. (New) An optical amplifier employing a rare earth-doped fiber as an amplification medium, the optical amplifier comprising:

an input monitoring unit that monitors full input light and outputs an input monitor signal;

an output monitoring unit that monitors full output light and outputs an output monitor signal;

an optical-offset-signal output unit that outputs an optical offset signal;

an optical coupler that combines the full input light and the optical offset signal; and

an optical-level detecting unit that converts an output signal from the optical coupler into an electrical signal, wherein

a gain control is performed in such a manner that a ratio of the output monitor signal to an output signal of the optical-level detecting unit becomes identical to a target average setup gain determined based on the signal intensity of the input monitor signal.

24. (New) A method of controlling a gain of an optical amplifier that employs a rare earth-doped fiber as an amplification medium, the method comprising:

first calculating including calculating a first target average setup gain at a maximum input intensity in an input dynamic range of an input light;

first setting including setting the gain of the optical amplifier to the first target average setup gain;

second calculating including calculating a second target average setup gain at a minimum input intensity in the input dynamic range of the input light;

second setting including

setting the gain of the optical amplifier to the first target average setup gain under a condition of the maximum input intensity; and

setting the gain of the optical amplifier to the second target average setup gain under a condition of the minimum input intensity; and

third calculating including calculating a third target average setup gain at each input intensity in the input dynamic rage of the input light.